Brand New Ears: A Look at Recording, Mixing, and Mastering

An Honors Thesis (TCOM 433)

by

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Abstract

The art of recording, mixing, and mastering music is a lot more technical than it appears upon listening to a song on the radio. The recording process requires technical planning and knowledge of signal flow in order to capture sound from microphones into audio recording software, Avid Pro Tools. The mixing process requires a keen ear for music, intensive knowledge of Pro Tools, and understanding about workflow and data management. The mastering process requires attention to detail and a knowledge of the exporting of files and creation of media. *Brand New Eyes* is a rock/metal band based in Indianapolis, Indiana. The production of their EP took two and a half months and includes five original songs.

Acknowledgements

I would like to thank Professor Stan Sollars for advising me during this project. His assistance and feedback were instrumental in the creation of my project. I would also like to thank David Wurdeman, a teaching assistant, and Jake Morris, a fellow student, who assisted me in setting up my recording session.

I would also like to thank Linda, Drew, Brayden, Cassandra, and Bekah, for their encouragement throughout the past three years.

Finally, I would like to thank my father, Chris, for his feedback, interest, and never-ending support in all that I do.

Author's Statement

I chose to record, mix, and master an EP, a short version of a full album which a band usually releases before an entire album, in stereo and surround sound in order to further my experience and knowledge within the audio production field and to hone my technical process throughout the three stages of production. This project was important because it gave me real-world experience within my field, a final product that I can display and for which I can take credit, and to help a musical group gain recording experience.

My recording process included communicating with the band that will play on the album, getting a feel for the band's sound, making technical decisions such as choosing between microphones and processors, setting up the recording session, recording multiple takes of each song, and going back over each song to record vocals and guitar solos if needed.

One of the most difficult aspects of the project itself was finding a reliable group of musicians willing to come into the studio to be recorded. At the beginning of this semester, I contacted a band called *Dr. Boldylocks and the Twitter All-Stars*. I had known the drummer from a band I recorded last year, so I figured the group would be reliable. However, after confirming dates, one member of the band was extremely rude and condescending to me. He thought that, since I am not a Music Media Production major, I had no idea what I was doing and that I was unwilling to put forth the time and effort needed to record their group. I decided to cut ties with this band and look for other options. This

was valuable experience with client communication and a test of my patience and professionalism.

Shortly after my exchange with the band, I found a different group called *Brand New Eyes*. They had experience recording with TCOM 433 classes and my roommate was personally friendly with each member of the band. I talked with them and set recording dates, one primary date and an additional date for a backup in case we needed more time in the studio. I went to see *Brand New Eyes* play a live show to get a feel for their sound and personalities. This was extremely beneficial because knowing the overall tone of the band is important when deciding which microphones and processors to use during the recording process.

After seeing the band live, I began to create my recording session plan. This consisted of my choices of microphones, a studio layout plan, patching maps, and a ProTools session plan. I chose specific microphones with the help of my advisor, Stan Sollars. Since I am not an expert on microphones, I received guidance from Stan based on how I wanted the band to sound. For example, I chose the SHURE SM7B microphone on the vocalist, Jenn, because she does some screaming throughout a few of the songs and is overall very loud. The SM7B works better than other vocal microphones in this type of situation because it is durable and can handle the extreme dynamics that metal music brings.

After deciding which microphones to use to record the band, I moved on to choosing which processors to use. There is a wide variety of processors to choose from in the Ball State University recording studios. David Yanes, a Teaching Assistant to Stan, helped me choose which processors to use based on his experience and knowledge of recording. I used the Aphex Aural Exciters on most of my drums because they enhance sonic quality and give the drums a bright tone. I also used gates on the drums in order to only record sound when the drum is actually hit, rather than picking up all of the sounds from the entire set. This helps to clean up the recording of the drum set overall and make it sound crisper. I used compressors on nearly every instrument in order to bring down the dynamic range, the difference between the softest and loudest sounds in a mix. Compressors help to make the mix sound like one coherent event, rather than a lot of misplaced tones that have been thrown together.

With the processors I planned to use decided, it was time for me to move on to the patching map. A patching map is used to help an audio engineer route the signal from the microphone into the recording software, ProTools, which is on the computer in the studio control room. The signal travels from the microphone into the input box in the wall of the studio. From there, the engineer has to manually create paths for the signal to flow into pre-amplifiers, processors, and into ProTools. This is my favorite part of the recording process because I love thinking about where the signal is going and creating the path through which it travels. Creating the patching map is simpler than it looks. The abbreviations for

each processor, pre-amplifier, and ProTools input can be found in the recording session log. The patching map shows what to connect within the path using simple cables.

After creating my patching map, I moved on to setting up my ProTools session. I created enough tracks within the program to correspond to each instrument, with extras in place if I were to need them. I made sure to document the name of each session I created and the location in which it was saved in order to minimize workflow issues between the recording and mixing processes. I set up the inputs of each track to correspond with the inputs of their respective microphones for each instrument. I also created tracks that would feed back into the studio so that each member of the band could hear themselves and the other members while playing, and myself when I needed to communicate with them. After creating a master session template, I copied the template five times and named them to correspond with each song I recorded for the band.

With all of the preparation finished, the recording day finally came, and I began to set up the recording session. I opened the first song, set up all of the microphones for each instrument, used cables to create a patch path for each track using my patching map, turned on all pre-amplifiers, and tested the signal flow in ProTools. I tested each hear back station to ensure that each member of the band would be able to hear the other instruments and my communication and waited for the band members to arrive.

Once the members of *Brand New Eyes* arrived in the studio, I immediately started sound check and began to adjust each processor for each individual instrument. This phase was the most difficult for me because I do not have much experience with processors. Luckily, David was there to help me adjust the processors and get each instrument sounding great. After finishing sound check, it was time to begin recording.

The members of *Brand New Eyes* are proficient musicians, so the recording process went smoothly and quickly. We had a rough mix we were all happy with after only two or three takes on nearly every song. After getting a good take, the band members would come into the control room and listen to the rough mix. If they were satisfied, then we would begin overdubbing the vocals and, on some songs, the guitar solos. Overdubbing is the process of layering sounds over tracks already recorded. In order to obtain a clean vocal track, the vocalist has to record vocals separately from the other instruments in the song. While the band members could get a good mix quickly, the vocalist, Jenn, struggled to stay on pitch while singing. We had to work longer on her vocals than on most of the instrument tracks. We finished recording the last song around 12:30 a.m., after a little over seven hours in the studio.

The recording process requires the most preparation and technical knowledge, but the mixing and mastering processes require a keen ear for music and a knowledge of how to navigate ProTools. I began mixing on the first song by going through each instrument track and applying plug-in processors to enhance

the quality and overall tone. Plug-in processors can include equalizers, reverb (echo/delay), compressors, limiters, and pitch-shifters. While I did not use all processors on any given track, I implemented a wide variety of plug-ins throughout the tracks on each of the five songs. After going through each track and becoming satisfied with how they all sounded individually, I gradually began to balance the loudness of each instrument with one another. If needed, I would create automation within the song so that the level of a track could get louder and softer as the song progressed. For instance, I raised the level of a guitar track during a guitar solo, and lowered it back down when the vocals came back in. After the levels of each instrument were balanced, I added light compression to the entire mix. By this time, I had a solid mix of the first song and was ready to move on to the next.

Moving from song to song is quite easy because of the feature in ProTools that allows the user to import settings from a previous session into a new one. This means that I could transfer all of the individual track plug-ins from the first song to the same instrument tracks on the second song. For example, since the drummer did not change anything about her drum set or drastically change her technique from one song to another, the drums tonally sounded very similar in each song. Therefore, I would not have to redo all of the sonic tweaking I did with each individual plug-in on the first mix, I would instead just have to make some minor adjustments to adapt the settings for a different song. This technique saved me hours of time during the mixing process. I repeated the process of

importing previous song settings, making tonal adjustments, balancing levels, and adding overall compression, for each of the five songs.

After mixing each song in stereo (two speakers), I bounced each mix into a stereo file. This brings all of the individual files for each track and applies all of the settings I made to them into one master file. Once I acquired each master file, I brought all five files (one for each song) into a new ProTools session and made sure that each song was about the same level, both according to the loudness meter within the program and how I perceived them with my ears. I made sure that the songs sounded good together when played one right after another. This process is called mastering.

Once all of my work in stereo was completed, I switched gears and went to surround sound mode. Surround sound, which uses 5 speakers and an LFE, or subwoofer, was fun to mix in because it is all about creating an atmosphere with sound. Surround sound mixing and mastering went by a lot quicker because I had already completed all of the tweaking of individual tracks in stereo, they just needed to be switched over to surround. Switching to surround is as easy as changing the input settings in ProTools. However, even though I was happy with all of my adjustments in stereo, settings for each individual track needed to be tweaked for surround sound. For instance, since there are five speakers rather than two, there was a lot more space in the mix. Therefore, I decided to duplicate the guitar tracks in order to make the mix sound more full. If I had done this in stereo, the mix would have sounded too busy, and the guitar might have

overpowered other instruments too much in the mix. For surround sound mixing, I converted inputs on each song, tweaked each individual instrument, panned each instrument to where I wanted it, and then applied compression and equalization to each entire mix. Panning is deciding what speaker out of which a sound will play. In other words, it is determining where the listener will perceive the sound is coming from. For instance, in many of the songs, I set the reverb of a few of the instruments to be panned to the back speakers. This allows for the perception that the music is coming from the front, but echoing behind the listener.

After completing mixing in surround sound, I used the same mastering technique as I did with the stereo mixing to ensure that no song out of the five was too loud or too soft compared to the others. I bounced each track into five individual sound files, one for each speaker, and created a DVD that included each song to turn in to Stan for TCOM 433. I received feedback from both Stan and my fellow students that helped me tweak and better my mixes.

This project was, by far, the most extensive and independent work I have done during my time at Ball State University. It was the most extensive work because it required my attention from the beginning of the semester to the very end, and occupied time each week for its progress. It was the most independent work I have completed because, apart from guidance in the right direction, I virtually completed this project on my own. I made the technical and artistic decisions, dealt with any issues I had with the band, equipment, or software

without a helping hand each step of the way. Producing this EP helped me further recording, mixing, and mastering techniques along with interpersonal and technical skills that I can take with me as I pursue a career in Audio Production.

8/18/2014

I contacted the band I will record, Dr. Boldylocks and the Twitter All-Stars. I contacted Matt Dailey, the drummer, because I have recorded him before, when he was with a different band. Matt asked his fellow current bandmates and they agreed to let me record them and work with me on this project.

9/8/2014

I researched microphones and decided which ones I want to use for my recording session. I also constructed my technical plan, which includes questions I have about preparing for my session. These are aspects of recording, mixing, and mastering that I'm unsure of or need a bit of extra guidance.

9/14/2014

I had a very negative correspondence with the liaison from the band. He was extremely rude and condescending to me, and had no interest in working with me because I am not a MMP major. He requested my experience and background and seemed unimpressed. I will be looking for other bands to record.

9/16/2014

I contacted a band called Brand New Eyes. They have recording experience with 433 classes and seem eager to come back to the studio. I contacted Matt Dailey and we agreed that recording Dr. Boldylocks and the Twitter All-Stars would not be happening. I talked to the members of Brand New Eyes to see what dates in October will work for them, and we have decided to record on October 12th and October 24th, the 24th being a backup date or extra recording time, if needed. We will record on the 24th if someone else has requested the studio on the 12th.

9/20/2014

I went to see Brand New Eyes perform live in Anderson, Indiana, at the American Veterans Lounge. The band was extremely energetic and the musicians seem to be quite talented, despite the lackluster acoustics of the venue. They are a heavy metal band with a female vocalist and most of their songs are very loud. Seeing the band live helps me get a better idea of the feel of the band and how they want their EP to sound. I also introduced myself in person to all of them so that I can develop a better relationship throughout the recording process.

9/22/2014

During class time I met with Professor Sollars. He gave me a project calendar with all deadlines outlined and specified in order to give me a timeline for my project. Additionally, I solidified October 12th and October 24th as reserved dates for my recording sessions in Studio B and confirmed the dates with the band.

10/1/2014

I developed tentative 5.1 Surround Sound Imaging Plans for each song that will be included on the EP. The titles of the songs are tentative because the band members have not decisively listed the five songs they will record. I made the imaging plans on Microsoft PowerPoint using simple shape tools. This was a great part of the project because it allowed me to think creatively about where I want the different instruments placed within the surround mix. I plan to use these as a guideline while beginning my surround mixing, but they are not set in stone—simply inspiration.

10/10/2014

I met with Professor Sollars in the green room located in the studios and developed my recording session log. I documented my microphone plans, patching paths, and decided which processors to use on each track. This was one of the most difficult parts of the project for me because I had never filled out a log by myself. However, I found it to be really enjoyable because I got to make all of the decisions. I decided to use a specific vocal mic (Shure SM7B) because it can handle the loud vocals that Jenn (vocalist of Brand New Eyes) will bring to the studio. I had some input from Professor Sollars and David, the Teaching Assistant who was helping me with my log, but ultimately, I was proud that I prepared for my session independently, and learned a lot in the process. I now feel much more confident about my session.

10/12/2014

I arrived at the studios at 11 a.m. and met Mike, the bassist, who brought the equipment. We hauled it up to the studio and set up the drum kit, guitar amps, and unit for the bass guitar. Mike left after the instruments were set up and David, Jake (a fellow classmate), and I went to work setting up microphones. I delegated the hearbacks to Jake while I tackled setting up microphones for the drum kit. David handled the guitar amps and also set up the vocal microphone. After finishing up with microphones, I went to work patching the signal flow for each channel and then set up the ProTools session. This part of the setup went very smoothly, and I was extremely thankful that I had prepared so much. I left the studio around 1 p.m. and got lunch. I was back in the studio by 3:30 p.m. to wait for the band to arrive at 4 p.m.. Jenn, Mike, and Danielle, the vocalist, bassist, and drummer, respectively, arrived around 4:15 p.m. and I began sound check on them. David and another Teaching Assistant, Christian, help me set up the processors on the drum kit. This was one of the most challenging aspects of the project because I had never done this before. However, I simply trusted my ears and did the best that I could. After helping me with the first few toms, David and Christian left, leaving me to run the session on my own, which was completely nerve-wracking. I finished up the sound check on drums and moved on to bass and vocals. They went a lot quicker and I felt pretty confident about altering settings on

both the pre amplifiers and processors by the end of sound check. At 5:30 p.m. the two guitarists arrived and I promptly ran sound check on them. We began recording at 6:15 p.m. The session ran very smoothly except for a major hiccup during the first song. I mistakenly was recording straight to my hard drive rather than the computer, and it completely slowed down the process. I ended up losing about a half hour of work, but I had session backups on the computer and was able to bounce back from my mistake quickly. The band did great in the studio, only taking three to four takes to perfect each song. Jenn struggled at times with her vocals, but by the end of the evening we had takes for each song that we were all happy with. Interacting with musicians is sometimes a tricky feat to accomplish, which was very apparent within our session, but I kept the band on track and we had all five songs recorded by 12:30 a.m. Monday morning. The band left, I struck the equipment, and left the studio around 1:30 a.m. David sent me a message the next day saying that I had done a good job tearing down everything, but that I had left adapters for a few microphones on the stands. I wasn't aware of the adapters, but will keep this in mind in the future. Overall, my session went really well. I was extremely happy about the efficiency and smoothness of the entire day.

10/25/2014

I began mixing. I was really frustrated and discouraged when I started off, but I believe that's because I started with the most challenging song—"Intro." It's tricky because the beginning of the song is quiet, but it kicks in very loudly after the intro. Additionally, the vocals on the song were not as in tune as I would have preferred them to be. My mixing process consisted of mixing each instrument separately, adding processing plug-ins as necessary, tweaking the adjustments on said plug-ins, and then balancing each instrument with the others, adding volume and panning automation as needed. I did rough mixes of three of the five songs. Importing the settings of the processing plug-ins from song to song was extremely helpful because, after I completed one song, I could quickly move to the next with a general starting point rather than starting from the raw recorded sound of each instrument all over again.

11/8/2014

I completed rough mixes of all five songs on the EP. I finished up the remaining tracks using the same process I used during my first mixing session for the first three songs. After this was completed, I went back to each song and added compression and equalization to the master fader in the session in order to get a feel for the finished product. I bounced .wav files of each stereo mix and emailed Professor Sollars to schedule an appointment during which he can review my rough mixes.

11/10/2014

During class time, I met with Stan and played a rough mix for him. He gave me some good feedback. He told me to lower the levels for my

guitars because, at times, they overshadow the vocals in the mix. He also suggested I switch the compressor on the vocals in order to keep the dynamic range. I will implement these changes to the rest of the tracks.

11/15/2014

I finished up my stereo mixing today. On each song, I reworked the balance between the guitars and the vocals in the mix. I brought down the volume of the guitars and changed the compressor on the vocal track in each song. Using Stan's recommendation, I also changed the compressor on the master mix. I bounced an interleaved stereo .wav file of each song to my hard drive and burned all five stereo mixes to a CD. I began mixing "Better Days" in 5.1 surround sound.

11/16/2014

I mixed all five songs into 5.1 surround sound. This has been my favorite part of the project thus far because I have enjoyed trying different methods of surround sound mixing and changing the placement of instruments. I have been running into leveling issues with surround sound and plan to ask Professor Sollars about which compressors and limiters to use when mixing in surround. I updated my 5.1 imaging plans to match my surround sound mixes. I hope to get feedback on my surround sound mixes this week.

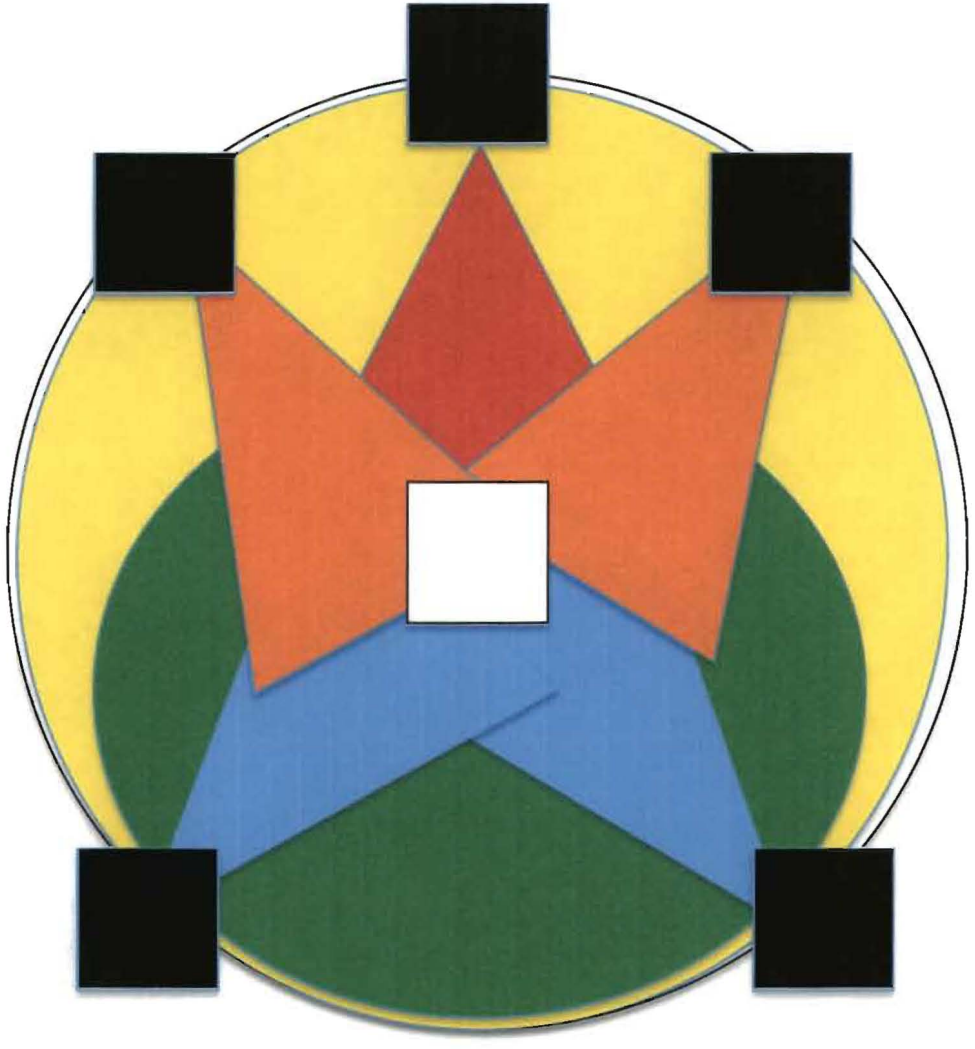
11/20/2014

I burned my surround sound mixes to DVD and made multiple copies. I used the tutorial on welovetcom.com that walked me through the step-by-step process and had no issues. I saved the project file in Adobe Encore so that I can simply import the new audio for each song if I make any adjustments to the mixes after hearing feedback during Monday's showcase.

12/02/2014

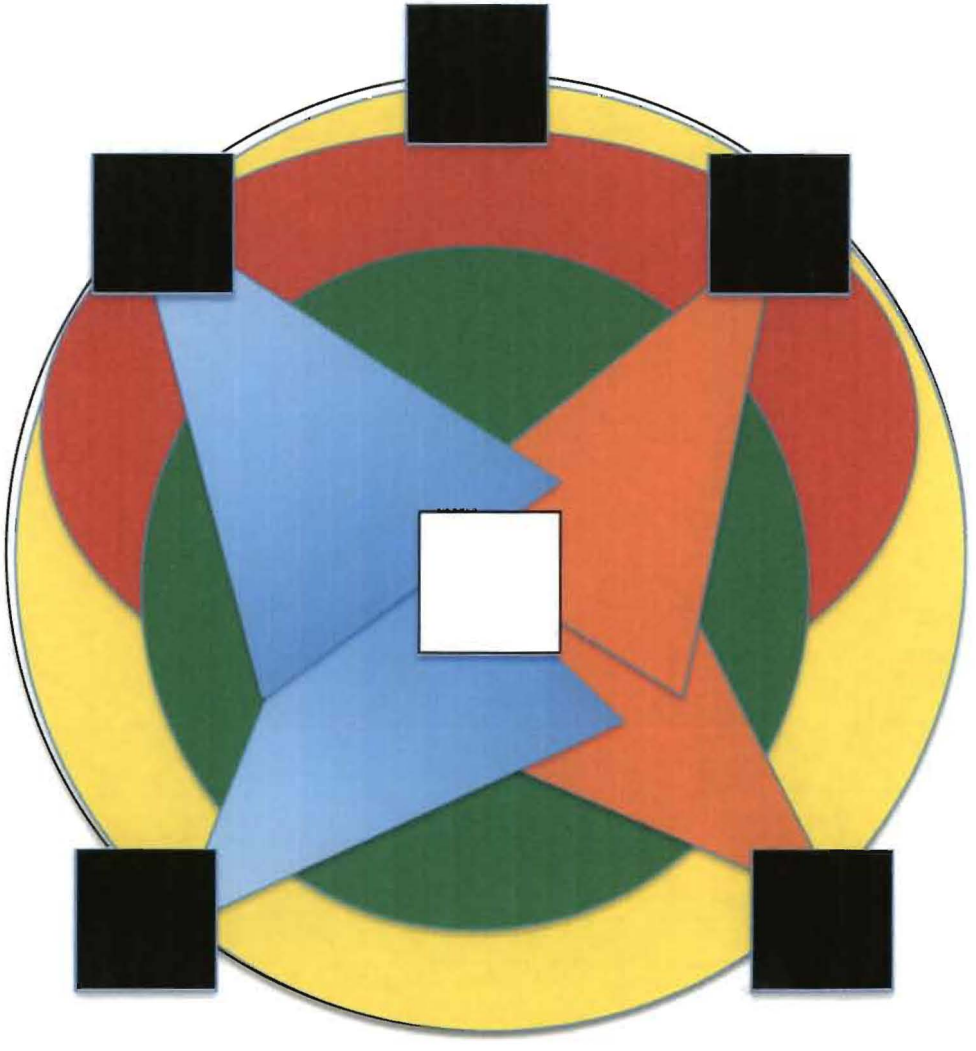
After receiving feedback from Rod Smith, the fill-in professor for Stan, I made some minor adjustments to my mixes. I compressed the drums a bit more to make them more apparent within the mix and raised levels of the kick and snare drums. I uploaded the new stereo mixes to the TCOM server and created a final DVD to turn in during finals week.

The Intro



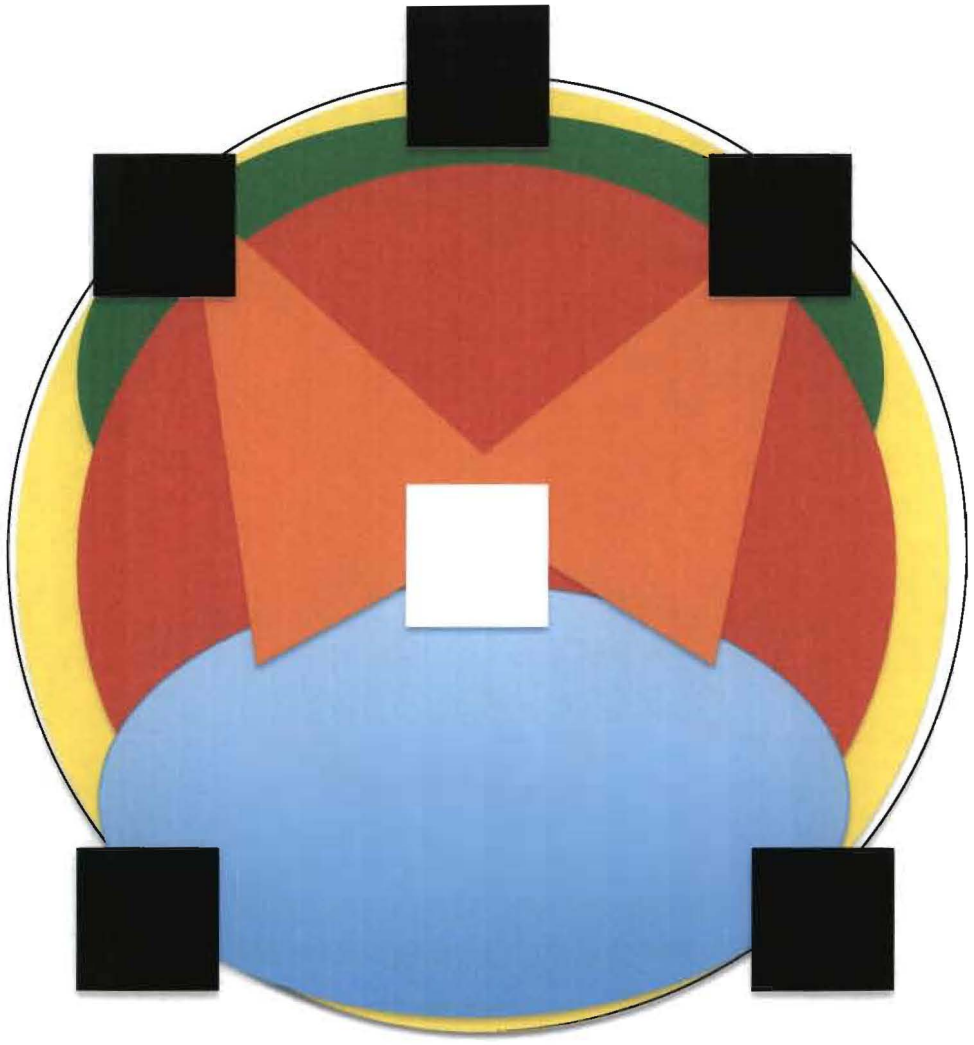
VOX
Rhythm Guitar
Lead Guitar
Bass
Drums

Time Well Wasted



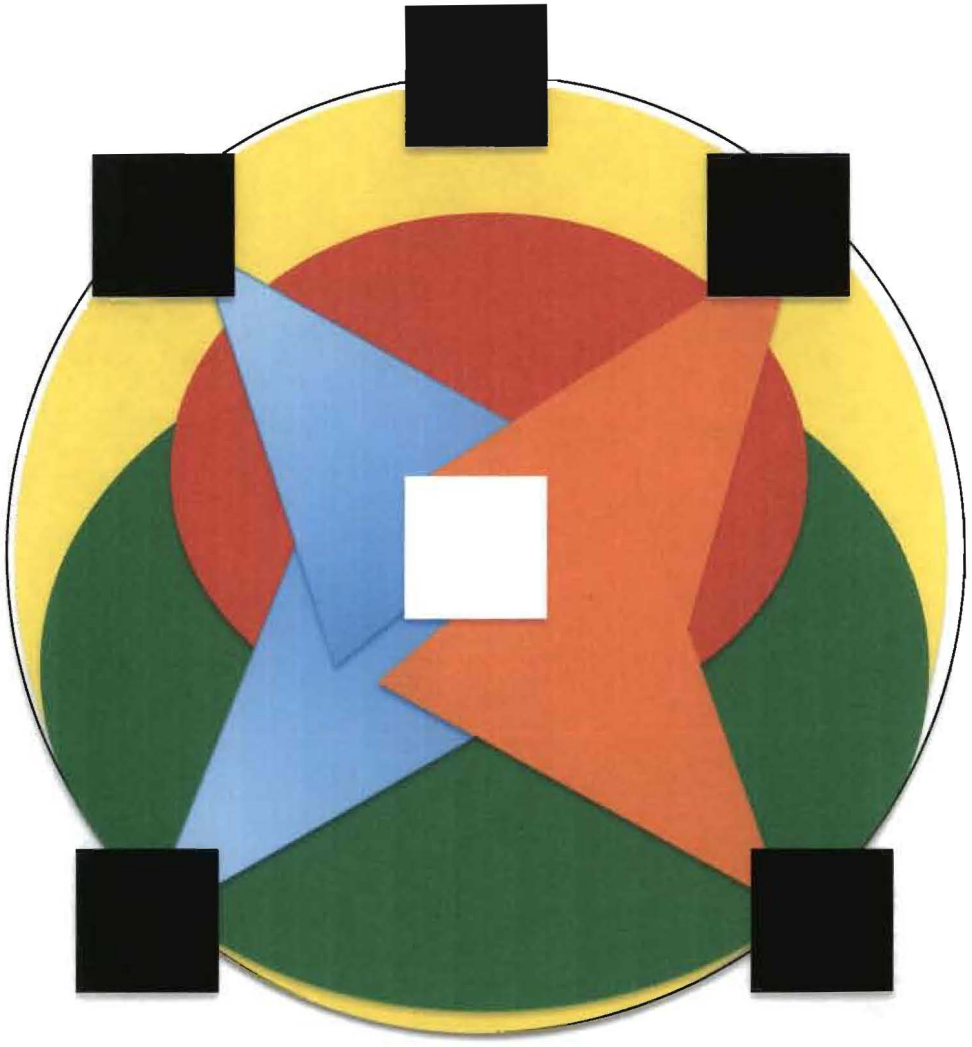
VOX
Rhythm Guitar
Lead Guitar
Bass
Drums

Part 2



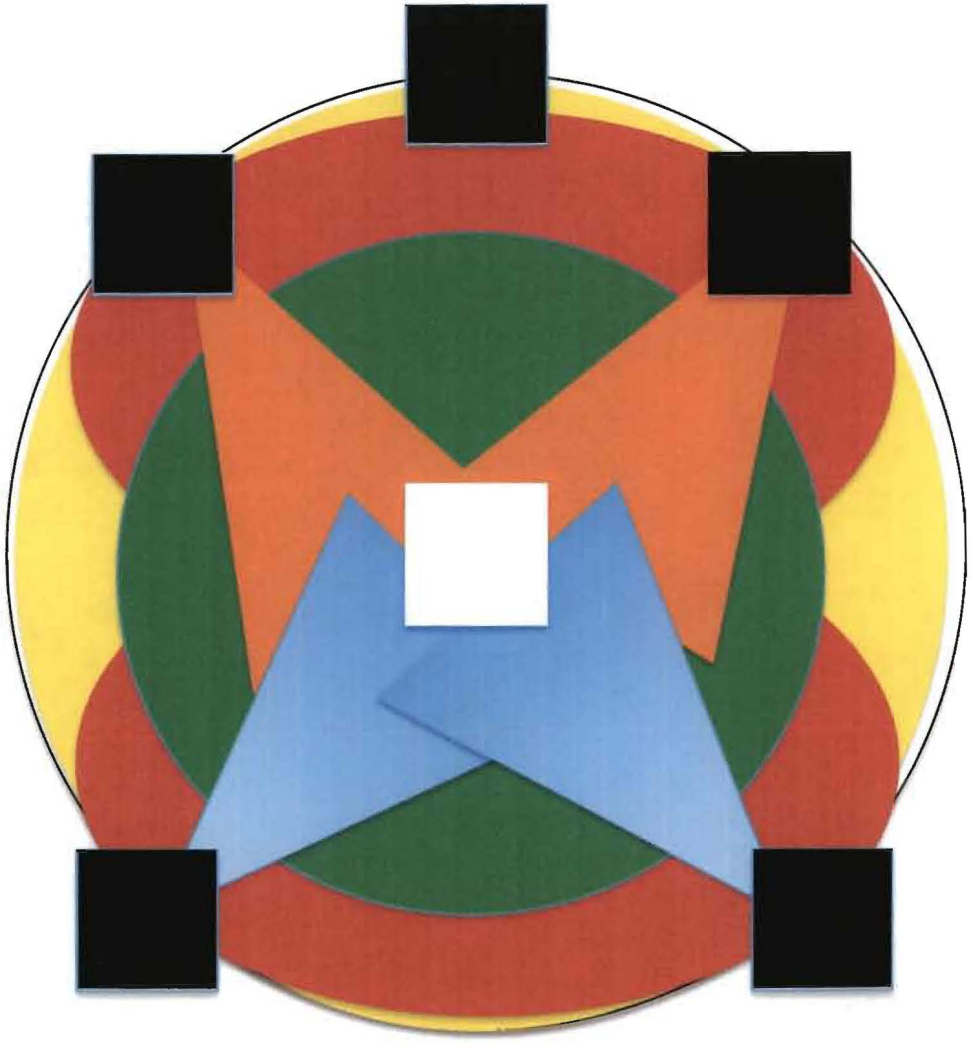
- VOX
- Rhythm Guitar
- Lead Guitar
- Bass
- Drums

Better Days



- VOX
- Rhythm Guitar
- Lead Guitar
- Bass
- Drums

All Hope is Gone



VOX
Rhythm Guitar
Lead Guitar
Bass
Drums

BSU TCOM 333/433, Sollars
Recording Session Log

Project: MUSIC PRODUCTION **Date:** 10-12-2014 **Studio:** B

Producer: Jennifer Farrington **Engineer:** Jennifer Farrington **Bit Depth / Sampling Rate:** 24bit / 96kHz

Pro Tools Root File Name: 43301_MUS_BRANDNEWEYES.ptx **Session Name:** 43301_MUS_BRANDNEWEYES

Backup Sources: Media Drive 1, ControlRoom B **Performers (Group Name):** Brand New Eyes

Individual Performer Contact Info: _____

Studio Set Up

TRACK	ELEMENT	TALENT	MIC/INTERFACE	WB#	WB INPUT
1	Kick	Danielle	Beta 52	4-10	57
2	Snare	Danielle	SM 57	4-10	58
3	Low Tom	Danielle	KSM 137	4-10	59
4	Hi Tom L	Danielle	KSM 137	4-10	60
5	Hi Tom R	Danielle	KSM 137	4-10	61
6	L Overhead	Danielle	AKG 414	4-10	62
7	R Overhead	Danielle	AKG 414	4-10	63
8	Hat	Danielle	AKG 451	4-10	64

BSU TCOM 333/433 Recording Session Log, Page 2,

Studio Set Up, continued

TRACK	ELEMENT	TALENT	MIC/INTERFACE	WB#	WB INPUT
9	Rhythm	Stacey	AKG 414	4-8	41
10	Rhythm	Stacey	AKG 414	4-8	41
11	Bass	Mike	Countryman D-Box	4-6	33
12	Bass	Mike	Countryman D-Box	4-6	33
13	Lead	Zack	AKG 414	4-8	42
14	Lead	Zack	AKG 414	4-8	42
15	Lead	Zack	AKG 414	4-8	42
16	Spare				
17	Vocals - scratch	Jenn	SM 7B	4-9	49
18	Vocals - lead A	Jenn	SM 7B	4-9	49
19	Vocals - lead B	Jenn	SM 7B	4-9	49
20	Vocals - backup A	Jenn	SM 7B	4-9	49
21	Vocals - backup B	Jenn	SM 7B	4-9	49
22					
23					
24					

Studio Set Up, continued

TRACK	ELEMENT	TALENT	MIC/INTERFACE	WB#	WB INPUT
25					
26					
27					
28					
29					
30					
31					
32					

NOTES:

Control Room Patching

TRACK	ELEMENT	PRE/TIE	PATCH PATH >	192 I/O	PT IN	HP SND
1	kick	8-1	204-5L → 622-4L → VARI-O2L →	192-4|1	A1	
2	snare	8-2	204-5R → 622-4R → 1176-1 →	192-4|2	A2	-
3	Low Tom	8-3	204-6L → 622-5L → 6061-7 →	192-4|3	A3	-
4	Hi Tom L	8-4	204-6R → 622-5R → 6061-8 →	192-4|4	A4	-
5	Hi Tom R	8-5	204-7L → 622-6L → 6061-9 →	192-4|5	A5	-
6	L Overhead	8-6	→	192-4|6	A6	-
7	R Overhead	8-7	→	192-4|7	A7	-
8	Hat	8-8	→	192-4|8	A8	-
9	Rhythm	6-1	204-7R → 1968-02L →	192-5|1	B1	-
10	Rhythm	6-1	204-7R → 1968-02L →	192-5|1	B1	-
11	Bass	5-1	6061-10 →	192-5|2	B2	-
12	Bass	5-1	6061-10 →	192-5|2	B2	-
13	Lead	6-2	204-8L → 1968-02R →	192-5|3	B3	-
14	Lead	6-2	204-8L → 1968-02R →	192-5|3	B3	-
15	Lead	6-2	204-8L → 1968-02R →	192-5|3	B3	-
16	Spare	—	—	—	—	—

Control Room Patching, continued

TRACK	ELEMENT	PRE/TIE	PATCH PATH >	192 I/O	PT IN	HP SND
17	VOX-scratch	7-1	661-11 →	192-5/4	B4	–
18	VOX-LD A					–
19	VOX-LD B					–
20	VOX-BK A					–
21	VOX-BK B					–
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						

Headphone Mix

HEARBACK CHANNEL	PT OUT	CONTENT
1&2	C-9&10	Drums
3	C-11	Rhythm
4	C-12	Bass
5	C-13	Lead
6	C-14	Vocals
7	C-15	Talkback
8	C-16	

Note: Make certain, via the output I/O config, that you have the analog outputs selected on the 192 I/O, rather than digital outputs.

BSU TCOM 333/433 Recording Session Log, Page 7

STUDIO INTERCONNECTION GRID

STUDIO	WB I/O	MIC INPUTS	MICS REPORT TO CR 1788 PRE-AMP INPUTS	ANALOG TIES	"PB" DATA TIES	"NET" DATA TIES	VIDEO TIES
A	4-1	Mic 1	1-1	T1 to T4 (f)	PB 1, PB 2	NET 1, NET 2	1, 2
	4-1	Mic 2	1-2	T5 to T8 (m)			
	4-1	Mic 3	1-3				
	4-1	Mic 4	1-4				
	4-1	Mic 5	1-5				
	4-1	Mic 6	1-6				
	4-1	Mic 7	1-7				
	4-1	Mic 8	1-8				
A	4-2	none	none	T9 to T12 (f) T13 to T16 (m)	PB 3, PB 4	NET 3, NET 4	3, 4
A	4-3	Mic 9	2-1	T17 to T20 (f)	PB 5, PB 6	NET 5, NET 6	5, 6
	4-3	Mic 10	2-2	T21 to T24 (m)			
	4-3	Mic 11	2-3				
	4-3	Mic 12	2-4				
	4-3	Mic 13	2-5				
	4-3	Mic 14	2-6				
	4-3	Mic 15	2-7				
	4-3	Mic 16	2-8				
A	4-4	Mic 17	3-1	T25 to T28 (f)	PB 7, PB 8	NET 7, NET 8	7, 8
	4-4	Mic 18	3-2	T29 to T32 (m)			
	4-4	Mic 19	3-3				
	4-4	Mic 20	3-4				
	4-4	Mic 21	3-5				
	4-4	Mic 22	3-6				
	4-4	Mic 23	3-7				
	4-4	Mic 24	3-8				

BSU TCOM 333/433 Recording Session Log, Page 8

STUDIO INTERCONNECTION GRID (continued)

STUDIO	WB I/O	MIC INPUTS	MICS REPORT TO CR 1788 PRE-AMP INPUTS	ANALOG TIES	"PB" DATA TIES	"NET" DATA TIES	VIDEO TIES
A Iso	4-5	Mic 25	4-1	T33 to T36 (f)	PB 9, PB 10	NET 9, NET 10	9, 10
	4-5	Mic 26	4-2	T37 to T40 (m)			
	4-5	Mic 27	4-3				
	4-5	Mic 28	4-4				
	4-5	Mic 29	4-5				
	4-5	Mic 30	4-6				
	4-5	Mic 31	4-7				
	4-5	Mic 32	4-8				
B	4-6	Mic 33	5-1	T41 to T44 (f)	PB 11, PB 12	NET 11, NET 12	11, 12
	4-6	Mic 34	5-2	T45 to T48 (m)			
	4-6	Mic 35	5-3				
	4-6	Mic 36	5-4				
	4-6	Mic 37	5-5				
	4-6	Mic 38	5-6				
	4-6	Mic 39	5-7				
	4-6	Mic 40	5-8				
B	4-7	none	none	T49 to T52 (f)	PB 13, PB 14	NET 13, NET 14	13, 14
				T53 to T56 (m)			
B	4-8	Mic 41	6-1	T57 to T60 (f)	PB 15, PB 16	NET 15, NET 16	15, 16
	4-8	Mic 42	6-2	T61 to T64 (m)			
	4-8	Mic 43	6-3				
	4-8	Mic 44	6-4				
	4-8	Mic 45	6-5				
	4-8	Mic 46	6-6				
	4-8	Mic 47	6-7				
	4-8	Mic 48	6-8				

BSU TCOM 333/433 Recording Session Log, Page 9

STUDIO INTERCONNECTION GRID (continued)

STUDIO	WB I/O	MIC INPUTS	MICS REPORT TO CR 1788 PRE-AMP INPUTS	ANALOG TIES	"PB" DATA TIES	"NET" DATA TIES	VIDEO TIES
B	4-9	Mic 49	7-1	T65 to T68 (f)	PB 17, PB 18	NET 17, NET 18	17, 18
	4-9	Mic 50	7-2	T69 to T72 (m)			
	4-9	Mic 51	7-3				
	4-9	Mic 52	7-4				
	4-9	Mic 53	7-5				
	4-9	Mic 54	7-6				
	4-9	Mic 55	7-7				
	4-9	Mic 56	7-8				
B Iso	4-10	Mic 57	8-1	T73 to T76 (f)	PB 19, PB 20	NET 19, NET 20	19, 20
	4-10	Mic 58	8-2	T77 to T80 (m)			
	4-10	Mic 59	8-3				
	4-10	Mic 60	8-4				
	4-10	Mic 61	8-5				
	4-10	Mic 62	8-6				
	4-10	Mic 63	8-7				
	4-10	Mic 64	8-8				

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EDIT SUITE INTERCONNECTION GRID

EDIT SUITE	LB ROOM #	WB I/O	ANALOG TIES	"PB" DATA TIES	"NET" DATA TIES	VIDEO TIES
1	246	7-1	E1 & E2 (f) (A) E3 & E4 (m) (A) E5 & E6 (f) (B) E7 & E8 (m) (B)	21, 22	25, 26	21, 22 (A) 23, 24 (B)
2	248	7-2	E9 & E10 (f) (A) E11 & E12 (m) (A) E13 & E14 (f) (B) E15 & E16 (m) (B)	23, 24	27, 28	25, 26 (A) 27, 28 (B)
3	247	7-3	E17 & E18 (f) (A) E19 & E20 (m) (A) E21 & E22 (f) (B) E23 & E24 (m) (B)	25, 26	29, 30	29, 30 (A) 31, 32 (B)
4	249	7-4	E25 & E26 (f) (A) E27 & E28 (m) (A) E29 & E30 (f) (B) E31 & E32 (m) (B)	27, 28	31, 32	33, 34 (A) 35, 36 (B)
5	250	7-5	E33 & E34 (f) (A) E35 & E36 (m) (A) E37 & E38 (f) (B) E39 & E40 (m) (B)	29, 30	33, 34	37, 38 (A) 39, 40 (B)

(A) = Feed from/to Control Room 2A
(B) = Feed from/to Control Room 2B
(f) = Female XLR
(m) = Male XLR

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RECORDING EQUIPMENT and SUPPLIES

Mics: AKG 414 (4) SHURE BETA 52
SHURE SM 7B AKG 451 B
SHURE SM 57
SHURE KSM 137 (3)

D-Boxes: Countryman

XLR Cables: 12

Jumpers: 1

CAT-6: 5

Patch Cables:

Starbird Booms: 0 ***Atlas Booms:*** 1 ***AKG/K&M Baby Booms:*** 11 ***Mini Booms:*** 1

Desk Stands: 3 ***Drum-Mic Clamps:*** 0 ***Other:***

Portable Pre-Amps: 0

Hearback Mixers: 5 ***Headphones:*** 5

Other Items: ***Axia Nodes:***

BSU TCOM
Letterman Recording Studios
Microphones and Studio Accessories
27 September 2013

Microphones

AEA:	R92 ribbon (1)
AKG:	C12VR multi-pattern tube (1) C414-TLII multi-pattern condenser (6) C451B cardioid condenser (2) C535 cardioid condenser (2) C3000 multi-pattern condenser (1) D112 cardioid dynamic (1) C214 cardioid condenser (2)
Audix:	D2 cardioid dynamic (2) D4 cardioid dynamic (1) D6 cardioid dynamic (1) I-5 cardioid dynamic (1)
Beyer:	M88 cardioid dynamic (2)
Bock:	151 cardioid tube (1)
Crown:	PZM-6RB condenser boundary (1) SASS-P Stereo condenser boundary (1)
DPA:	4012 cardioid condenser, 130V (2)
Earthworks:	QTC-40 omnidirectional condenser (2)
Neumann:	KM184 cardioid condenser (2) TLM49 cardioid condenser (2) U87 multi-pattern condenser (2)
Rode:	NT-4 stereo (XY) condenser (2) NT-5 cardioid condenser (2)
Royer:	R-122 ribbon condenser (2)
Schoeps:	CMC6/MK4/MK41 cardioid condenser (3)
Sennheiser:	MD421-II: cardioid condenser (2) MKH416: lobar cardioid condenser (1)

(Continued on page two)

Shure:	Beta 52 cardioid dynamic (2)
	Beta 57 cardioid dynamic (4)
	Beta 87 cardioid condenser (2)
	KSM32 cardioid condenser (2)
	KSM137 cardioid condenser (5)
	SM7B cardioid dynamic (1)
	SM57 cardioid dynamic (4)
	SM81 cardioid condenser (4)
Soundfield:	C511 Mark V surround condenser (1)
Yamaha:	SKRM-100 Sub Kick bi-directional dynamic (1)

Direct Inject Boxes

BSS:	AR-133 (16)
Countryman:	Type 85 (6)

Portable Pre-Amps

Aphex:	207 tube (2)
	207D tube (2)
	1100 tube (1)
Chandler:	TG Channel (1)
Focusrite:	Red 8 (1)

Universal Audio: 2-610 tube (1)

XLR Cables

Canare:	L-4E6S, 50-ft. (60)
	L-4E6S, 25-ft. (15)

Instrument Cables

Fender: Classic Tweed, 10-ft. (10)

Jumper Cables

Assorted TRS and TS to XLRM and XLRF

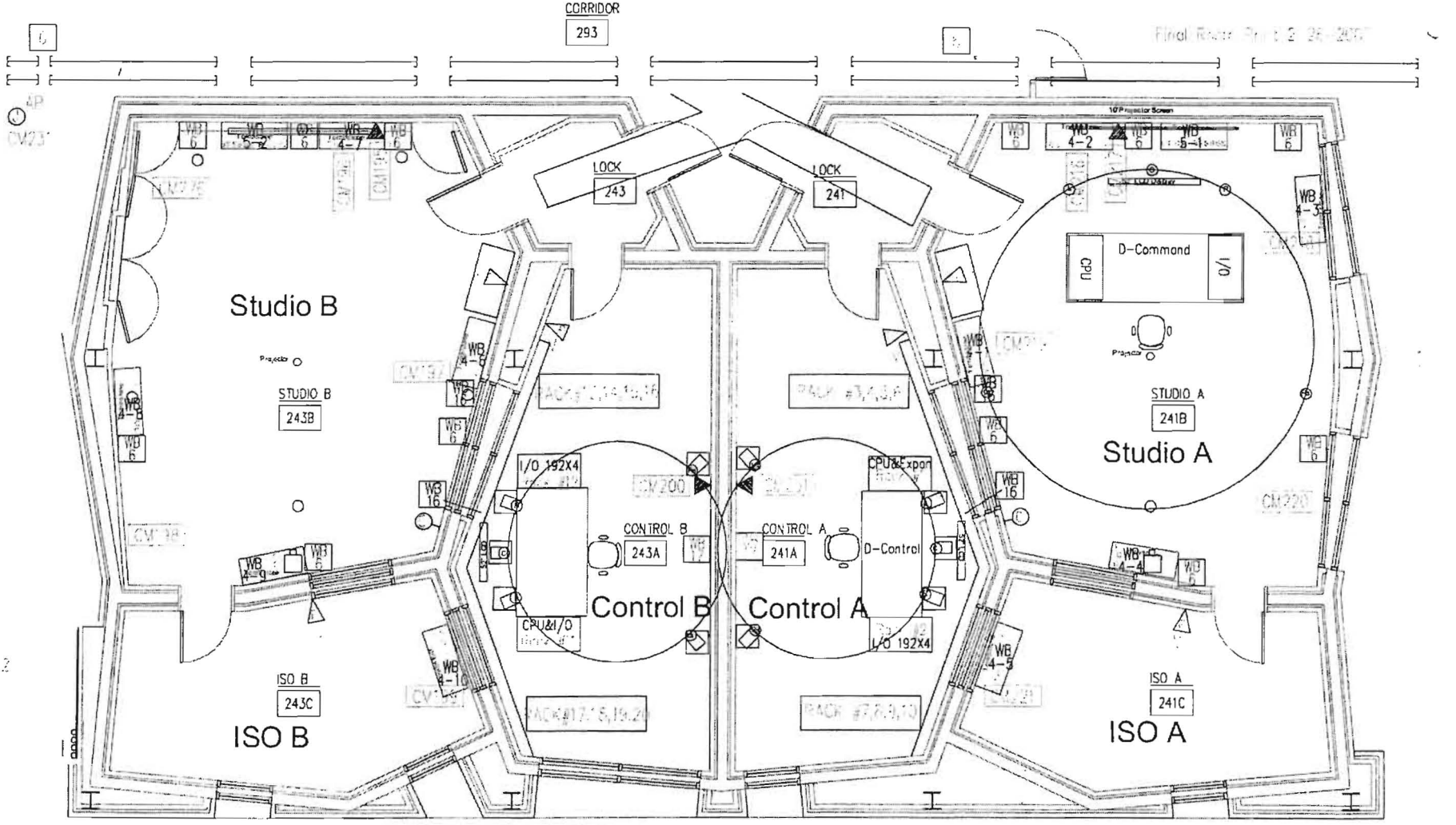
BSU TCOM, Sollars
LB Control 2A and Control 2B
Patch Panel Abbreviations

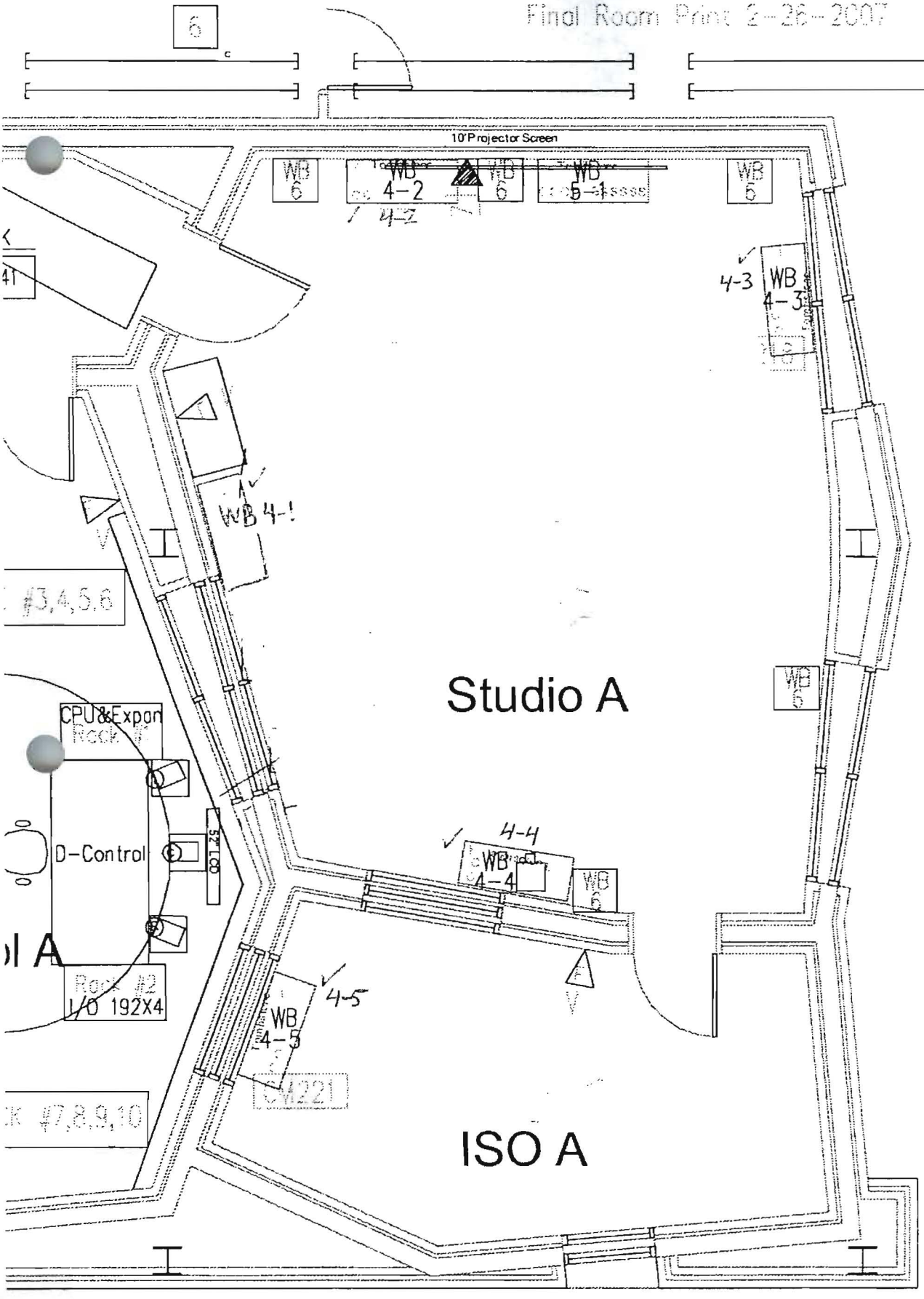
Control 2A, LB241

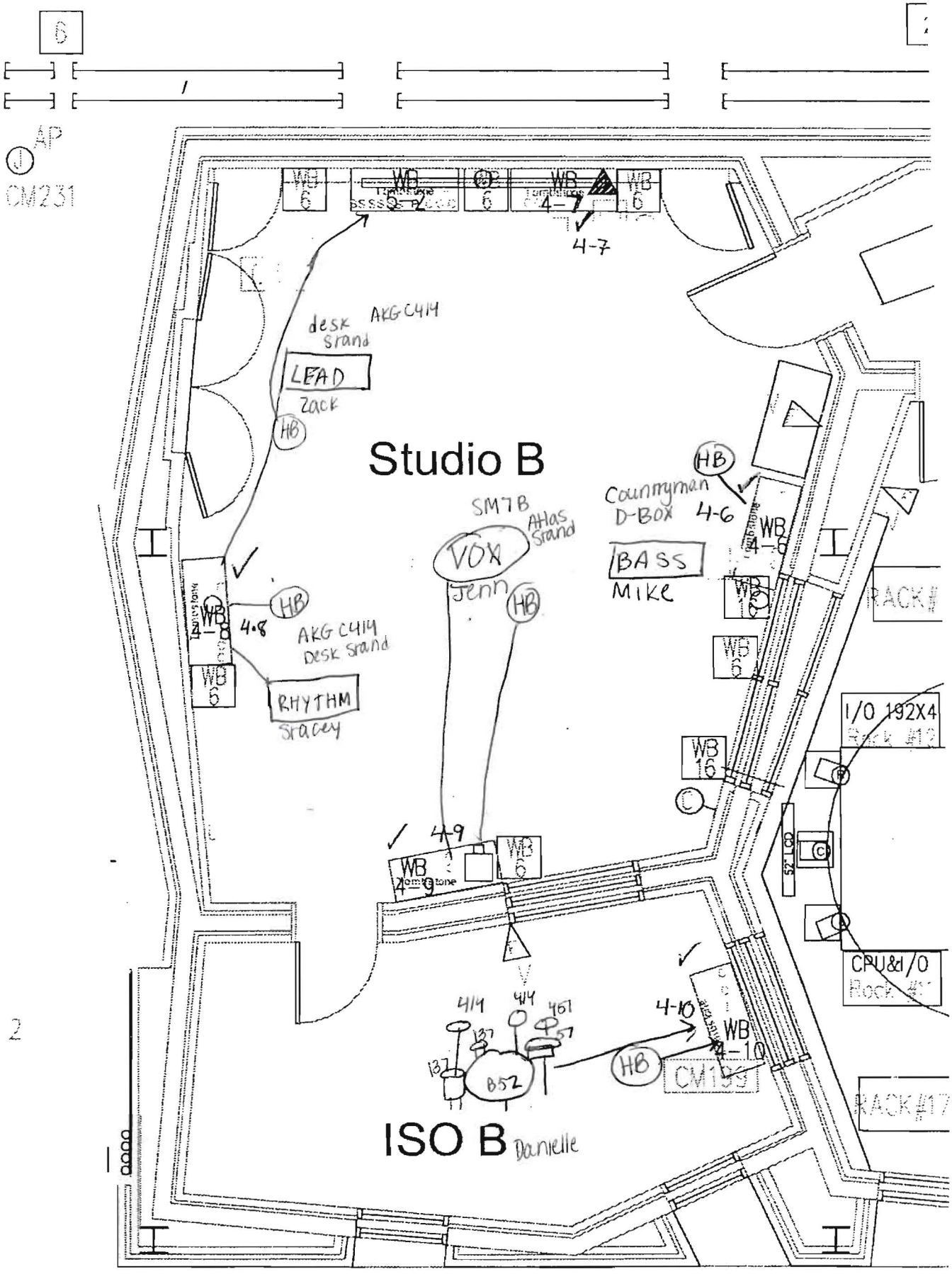
Patch Panel Abbreviation	***Component***
204-1L, 204-1R; 204-2L, 204-2R; 204-3L, 204-3R; 204-4L, 204-5R	Aphex Aural Exciter, Model 204
1968-01L, 1968-01R	Drawmer Tube Compressor, Model 1968
622-1L, 622-1R; 622-2L, 622-2R; 622-3L, 622-3R	Aphex Expander Gate, Model 622
661-1, 661-2, 661-3, 661-4,661-5, 661-6	Aphex Tube Compressor, Model 661
VARI-01-L; VARI-01-R	Manley Variable Mu Tube Compressor
AVA-L; AVA-R	Avalon Tube Compressor, Model AD2044
160-1, 160-2	dbx, Model 160 Compressor
1176-3	UREI (Universal Audio) 1176LN Peak Limiter

Control 2B, LB243

Patch Panel Abbreviation	***Component***
204-5L, 204-5R, 204-6L, 204-6R, 204-7L, 204-7R, 204-8L, 204-8R	Aphex Aural Exciter, Model 204
1968-02L, 1968-02R	Drawmer Tube Compressor, Model 1968
622-4L, 622-4R, 622-5L, 622-5R, 622-6L, 622-6R	Aphex Expander Gate, Model 622
LA-2A-1, LA-2A-2	Tektronics/Universal Audio, Model LA-2A Tube Leveling Amplifier
661-7, 661-8, 661-9, 661-10, 661-11, 661-12	Aphex Tube Compressor, Model 661
TLA-01, TLA-02	Summit Tube Leveling Amp, Model TLA-50
VARI-02L, VARI-02R	Manley Variable Mu Tube Compressor
1176-1, 1176-2	Universal Audio 1176LN Peak Limiter
RED 3L, RED 3R	Focusrite Red 3 Compressor


CORRIDOR
293
LOCK
243
LOCK
241
Studio B
STUDIO B
243B
Studio A
STUDIO A
241B
D-Command
CPU
I/O
I/O 192X4
CONTROL B
243A
CONTROL A
241A
D-Control
CPU&Expan
Control B
Control A
CPU&I/O
I/O 192X4
ISO B
243C
ISO B
ISO A
241C
ISO A


Final Room Print 2-26-2007
10'Projector Screen
WB 6
WB 4-2
WB 5-1
WB 4-3
WB 4-1
#3,4,5,6
Studio A
CPU&Expan
D-Control
WB 4-4
WB 4-5
Rack #2
I/O 192X4
#7,8,9,10
ISO A



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